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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,320	11/12/2003	Craig S. Gittleman	GP-303297	6448

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EXAMINER

LAWRENCE JR, FRANK M

ART UNIT	PAPER NUMBER
1724	

DATE MAILED: 03/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/706,320

Applicant(s)

GITTLEMAN ET AL.

Examiner

Frank M. Lawrence

Art Unit

1724

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-71 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-71 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. In view of the Appeal Brief filed on February 2, 2006, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below.

The prosecution of this application has been transferred to Examiner Frank M. Lawrence due to the retirement of the previous examiner. A new non-final rejection is submitted because new grounds of rejection are raised. The finality of the previous action is withdrawn.

Specification

2. The disclosure is objected to because of the following informalities: In line 2 of claims 30 and 31, “the” should be inserted before “at least”.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 6 and 7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 6 and 7 recite third and fourth equalization down stages taking place following the second down stage recited in claim 1. Amended claim 1 recites that the blow down stage “directly” follows the second equalization stage. There is no disclosure in the original specification that describes such an embodiment where the blow down stage directly follows the second equalization stage, and that third and fourth equalization stages take place between the second stage and blow down stage.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 6, 7, 13, 15, 16, 38, 40, 41, 58, 60 and 61 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 67 are indefinite because it is unclear how the blow down stage can directly follow the second equalization stage, while the third and fourth equalization stages take place between the second stage and blow down stage.

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With respect to claims 13, 15, 16, 38, 40, 41, 58, 60 and 61, the % hydrogen should be defined as mole %, volume %, or weight %.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-8, 11, 14-17, 20-23, 26-33, 36, 39-42, 45-48, 51-62 and 65-71 are rejected under 35 U.S.C. 102(b) as being anticipated by Fuderer et al. (3,986,849).

9. Fuderer et al. '849 teach a pressure swing adsorption system, comprising at least nine adsorption tanks, each having a feed end connected to a feed manifold and an exhaust manifold, a product end connected to a product manifold and several interconnecting manifolds, valves for controlling flow between each tank and each manifold, an activated carbon sorbent at the feed end of the tank, and a calcium zeolite A adsorbent in the product end of the tank, wherein the system is used to produce over 99.99% pure hydrogen product from a feed stream containing hydrogen and impurities such as carbon monoxide, carbon dioxide, nitrogen, water, light sulfur compounds, and light saturated and unsaturated hydrocarbons (includes methane, ethane, propane, etc.) (see col. 7, lines 47-68, col. 8, lines 20-36, col. 9, lines 14-34, col. 12, line 66 to col. 13, line 26).

10. In operation, the system is cycled by performing steps on each tank, including operating in a production stage for a plurality of cycle periods to produce product gas from feed gas, operating in a first equalization down stage following the production stage for a cycle period by

coupling the product end to the product end of an adjacent vessel at a lower pressure to lower the pressure, operating in a second equalization down stage for a cycle period by coupling the product end to the product end of another vessel at a lower pressure, operating in a third equalization down stage (PP stage) for two cycle periods by coupling the product end to the product end of another vessel that is at a purge pressure to lower the pressure, operating in a blow-down stage following the PP stage for a cycle period to reduce the tank to an exhaust pressure, operating in a purge stage for two cycle periods by feeding reduced pressure product gas into the product end of the tank and emitting exhaust gas through the feed end, operating in two to four consecutive, separate equalization up stages for one cycle period each following the purge stage by coupling the product end to the product end of an adjacent tank at a higher pressure to increase pressure, operating in a product pressurization stage (FR stage) following the last equalization upstage for one cycle period by pressurizing the vessel with product gas to a product pressure, and operating in the production stage again (see figures 5-7 for 3 equalization stage embodiment, figures 11-13 for 4 stage embodiment). The system operates at between 3-5 atm at points between the equalization down stages and blow-down stage (see figures 4a, 4b, col. 9, lines 25-50). With respect to claims 58-62 and 65-70, no structural limitations are recited that would distinguish the claimed device over the system of the prior art.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 13, 18, 19, 24, 25, 38, 43, 44, 49, 50, 63 and 64 are rejected under 35 U.S.C.

103(a) as being unpatentable over Fuderer et al. '849.

13. Fuderer et al. '849 disclose all of the limitations of the claims except that zeolite is a zeolite 5A, that the feed gas contains less than 59% hydrogen, and that the PSA system operates at between 60-100° C. Absent a proper showing of criticality or unexpected results, it is submitted that the operating temperature is a parameter that would have been routinely optimized by one having skilled in the art in order to achieve optimum adsorption and desorption conditions on the adsorbents whose operation is temperature sensitive. Also, one having ordinary skill in the art would know to select a type of zeolite that is most effective for adsorbing target contaminants based on cost, availability, the level of contamination, and the desired purity level of the product gas, and to use the system to purify feed gas having any acceptable or conventional level of hydrogen.

14. Claims 9 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuderer et al. '849 in view of Lemcoff et al. (5,820,656).

15. Fuderer et al. '849 disclose all of the limitations of the claims except that valves at the feed and product ends are rotary valves. Lemcoff et al. '656 disclose the use of a separate rotary valve at both the feed end and the product end of adsorber vessels as an alternative to the use of multiple fixed valves. It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute a separate rotary valve for both the feed and product valves of the adsorber vessels of Fuderer et al. '849 in order to reduce the number of valves and moving parts requiring control.

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16. Claims 10, 35 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuderer et al. '849 in view of Lemcoff et al. (5,807,423).

17. Fuderer et al. '849 disclose all of the limitations of the claims except that valves at the feed and product ends are a single rotary valve. Lemcoff et al. '423 disclose the use of a single rotary valve for both the feed and product streams from multiple adsorber vessels as an alternative to the use of multiple fixed valves. It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute a single rotary valve for both the feed and product valves of the adsorber vessels of Fuderer et al. '849 in order to reduce the number of valves and moving parts requiring control.

18. Claims 12 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuderer et al. '849 in view of Towler et al. (6,299,994) or Gittleman et al. (2002/0110504).

19. Fuderer et al. '849 disclose all of the limitations of the claims except that the hydrogen product gas is fed directly to a fuel cell. Both Towler et al. '994 and Gittleman et al. '504 disclose that purified hydrogen product gas can be fed directly into a fuel cell. It would have been obvious to one having ordinary skill in the art at the time of the invention to direct the purified hydrogen product gas from the system of Fuderer et al. '849 directly into a fuel cell because the prior system is capable of producing high purity hydrogen that can be used in a fuel cell.

Response to Arguments

20. Applicant's arguments filed February 2, 2006 have been fully considered but they are not persuasive. Applicant argues that the blow down step in Fuderer does not take place directly following the equalization down stage, however in the embodiment of figures 5-7 for example,

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the PP stage anticipates the second equalization down stage as claimed because the vessel product end is coupled to the product end of an adjacent vessel at a purge pressure to lower the pressure. Also, claim 1 as amended renders claims 6 and 7 indefinite because additional steps are inserted in between the down stage and blow-down stage. With respect to claim 52, the system is inherently capable of performing all of the steps regardless of the disclosed operation because it contains all of the structural components needed to do so.

21. Applicant also argues that Fuderer does not specify how the vessels are interconnected for the down stages, however the process flow diagram, time diagram, and valve operation chart of figures 5-7 for example show that the product ends are coupled. For applicant's convenience, the examiner has attached copies of figure 5 annotated for the first eight time cycles, showing open valves and vessel conditions. Applicant further argues the Fuderer fails to disclose vessel coupling in the PP stage, however note in the first time cycle for figure 5, for example, where vessel 5 in the PP stage is coupled to the product end of vessel 4 which is in a purge stage, via valves 34 and 35.

22. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., that a second equalization down stage includes coupling the product end of the vessel to the product end of an adjacent vessel and that there is a blow-down stage directly following the second down stage) are not recited in the rejected claim 28. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

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23. Applicant also argues that Fuderer fails to disclose a purge stage including feeding reduced-pressure product gas into the product end of the vessel, however this takes place as co-current product gas emanating from a vessel in a PP stage is directed to a vessel in a purge stage. With respect to claim 7, applicant argues that Fuderer fails to disclose fourth equilibrium down and up stages, however this embodiment is disclosed in figures 11-13, col. 12, line 66 to col. 13, line 26.

24. Applicant also argues that the Fuderer system does not operate at pressures less than 7 atm, preferably between 3-5 atm, however it is submitted that the prior system operates in a broad range of pressures over its time cycle, including pressures at and between 41-83 psi (about 3-6 atm) during depressurization and blow-down stages (see figures 4a, 4b, col. 9, lines 35-50). With respect to claims 19, 44 and 64, the examiner agrees that Fuderer does not specifically disclose using a zeolite 5A adsorbent, but does disclose using a calcium zeolite A in an example. An new obviousness rejection is submitted to address the limitation of adsorbent selection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frank M. Lawrence whose telephone number is 571-272-1161. The examiner can normally be reached on Mon-Thurs 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Frank M. Lawrence
Primary Examiner
Art Unit 1724

Frank Lawrence
2-27-06

DUANE SMITH
SUPERVISORY PATENT EXAMINER

D - M

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Appendix 1

⊙ = open
● = open flow regulator

FIG. 5

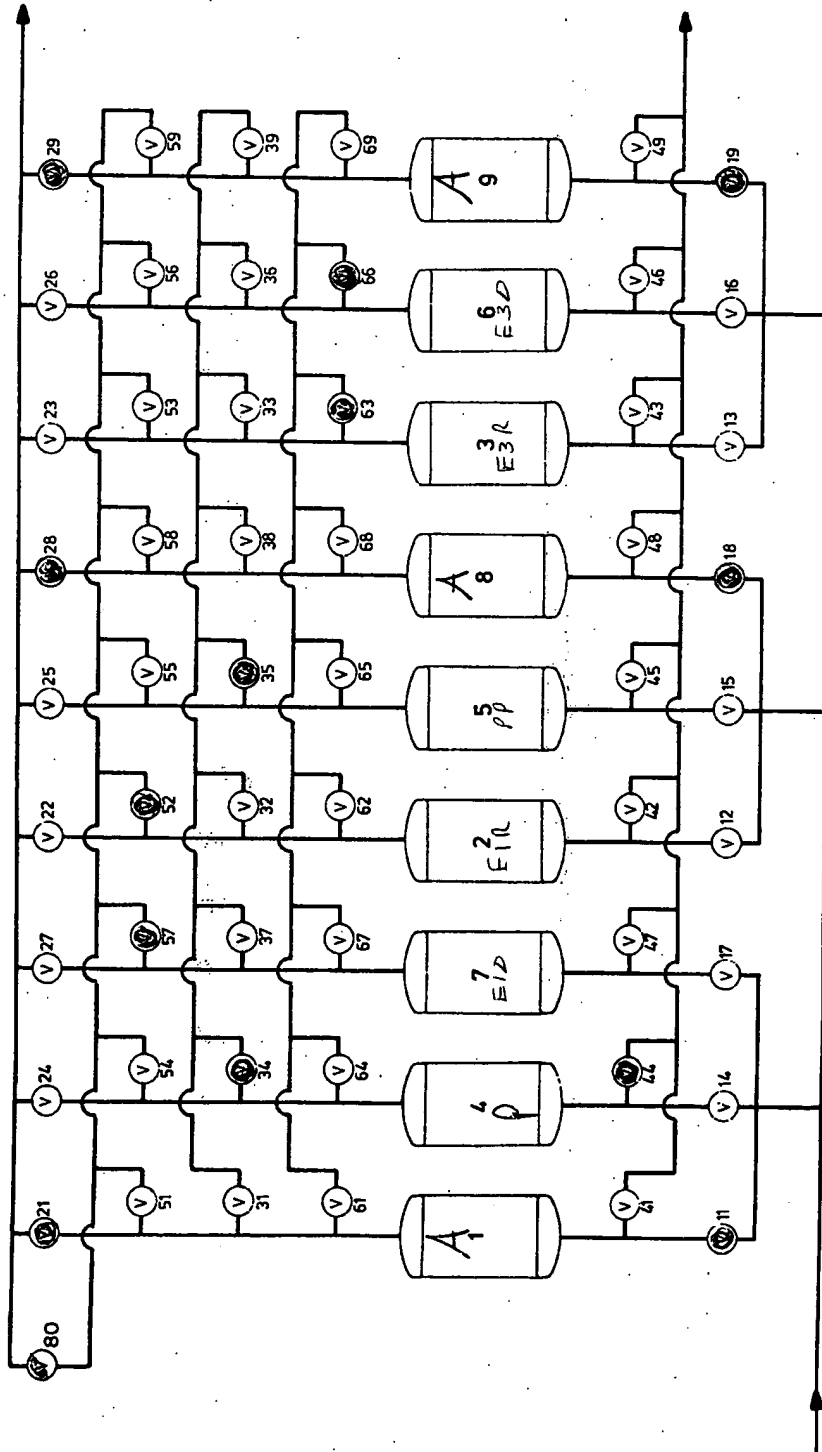


FIG. 5

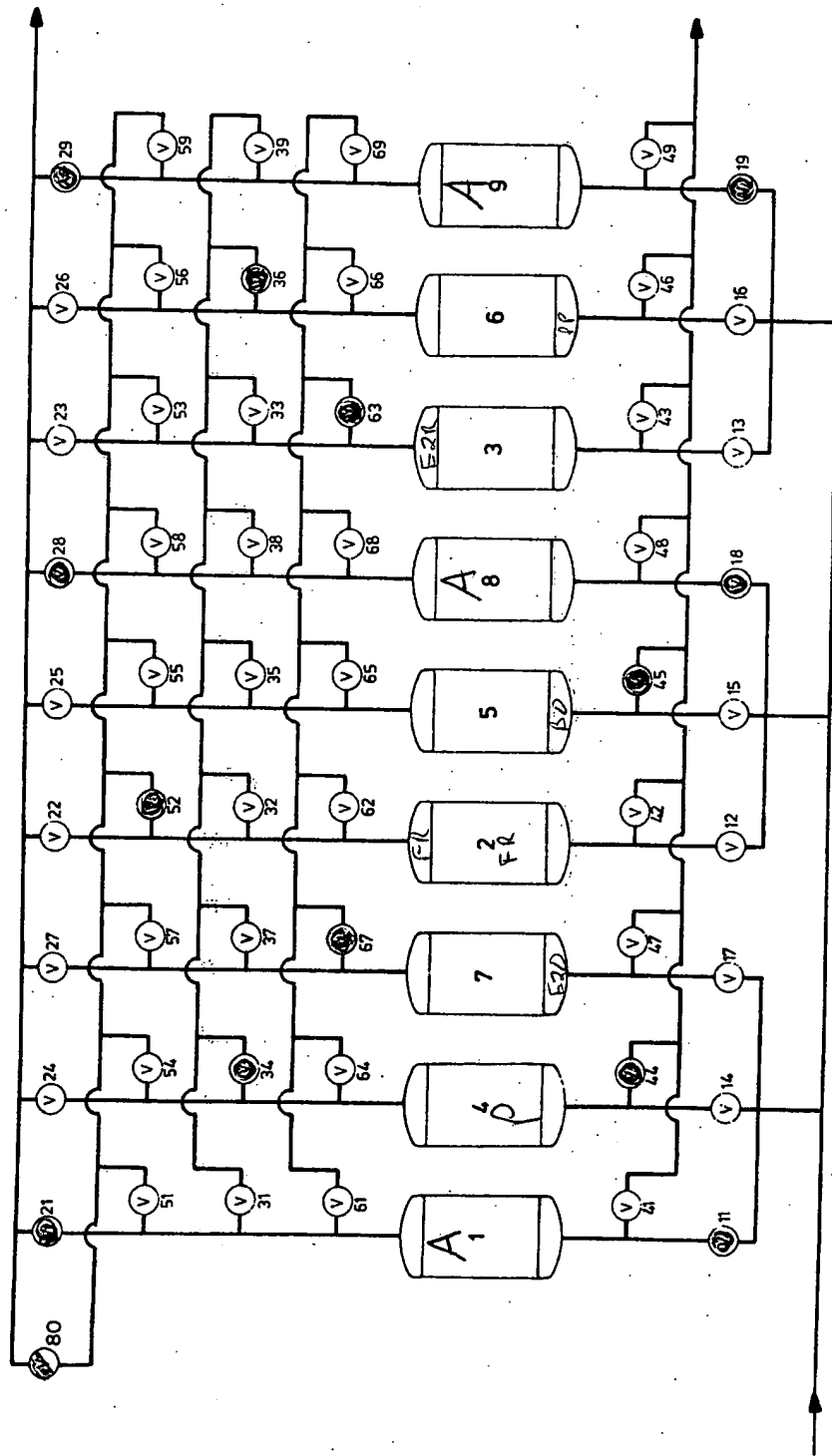
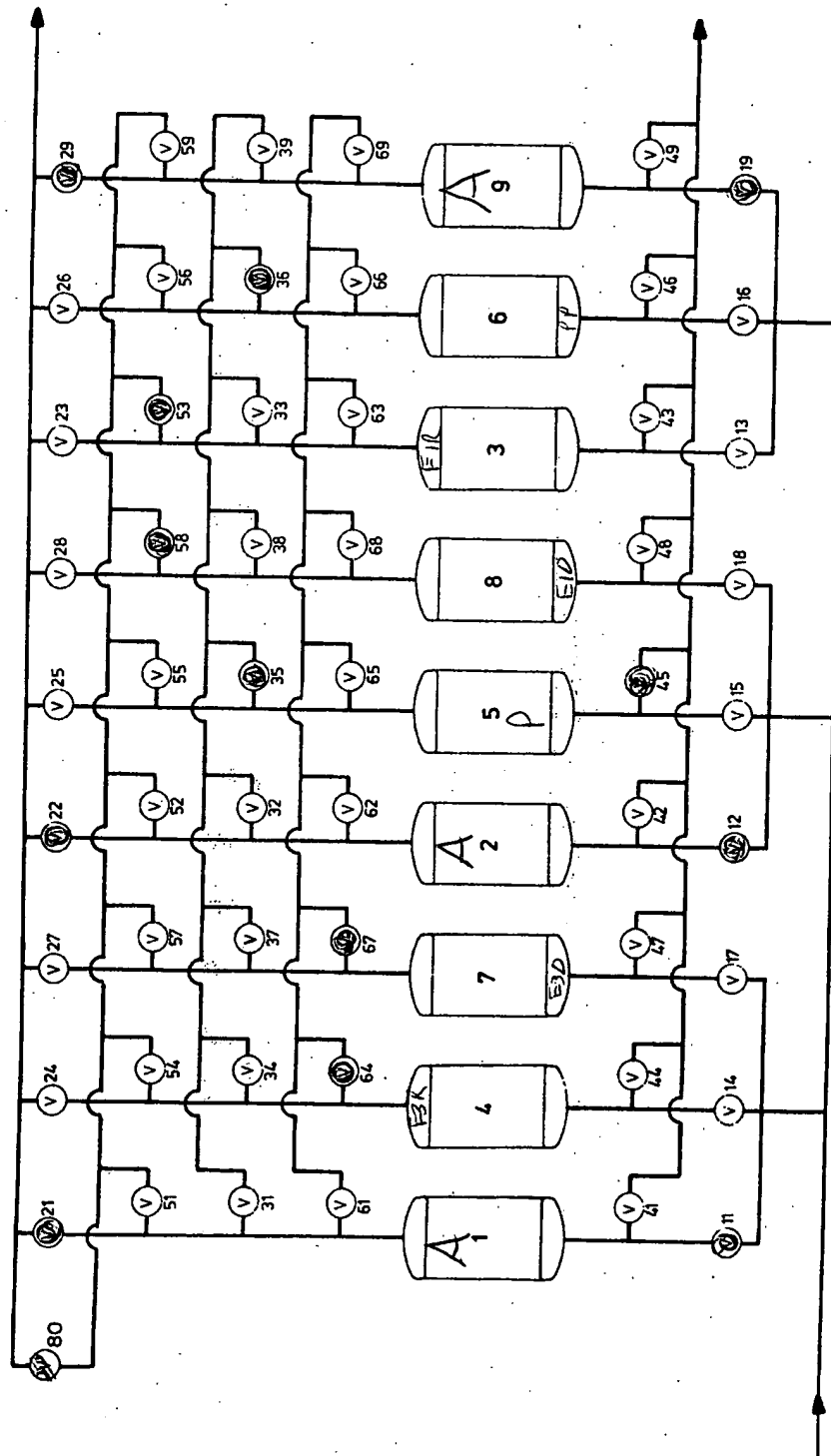
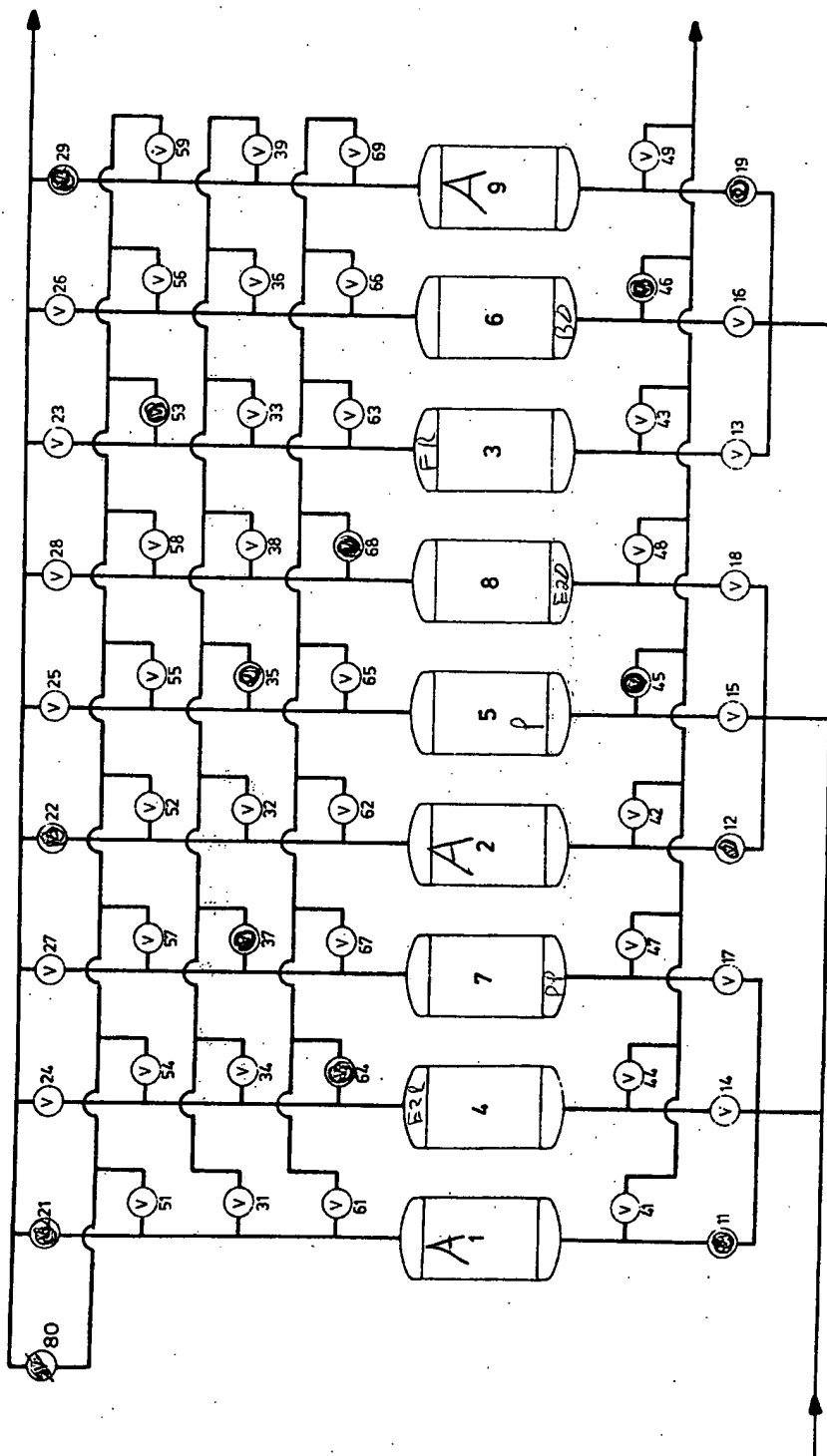


FIG. 5



Appendix 4

FIG. 5



Appendix 5

FIG. 5

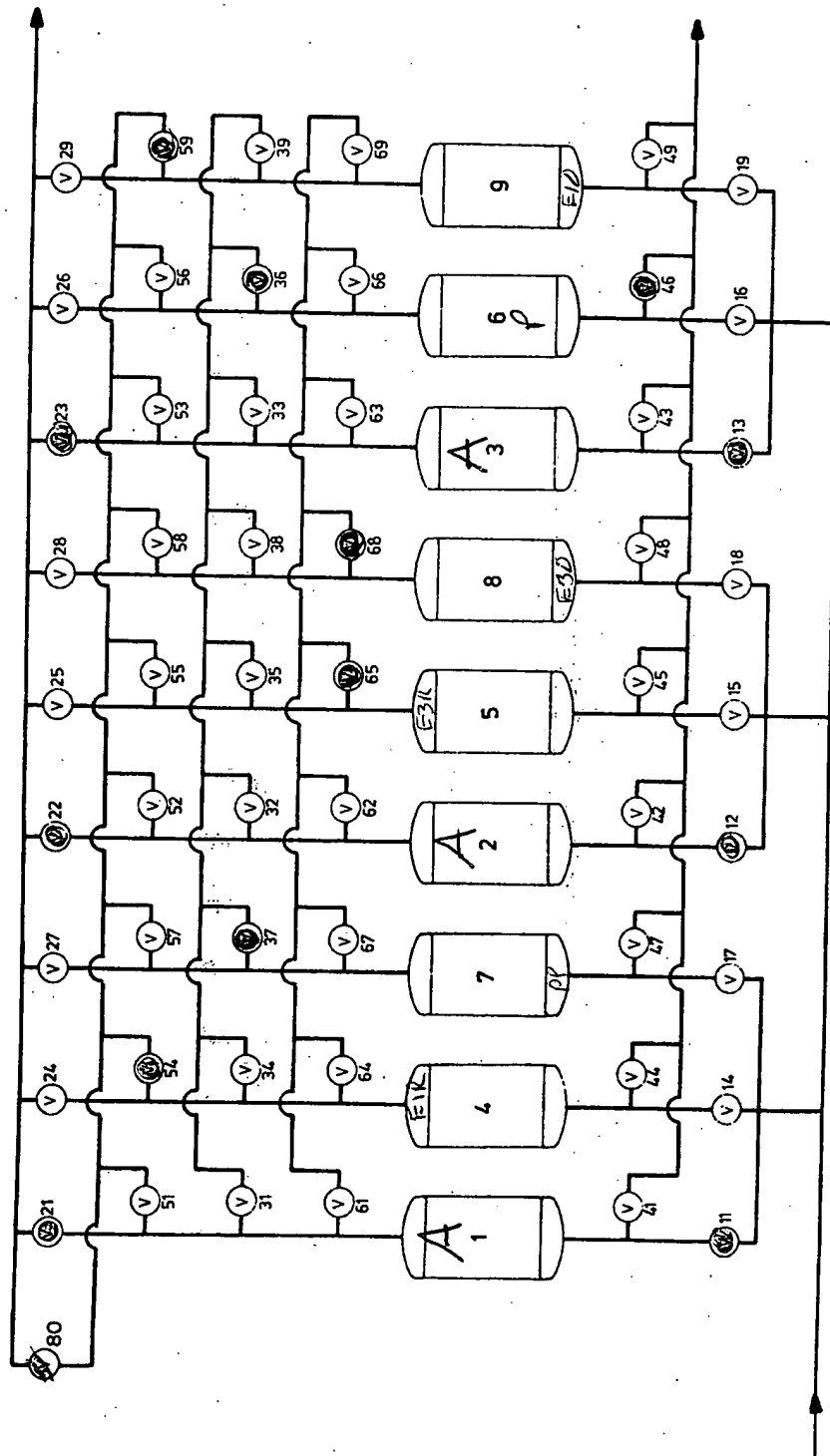


FIG. 5

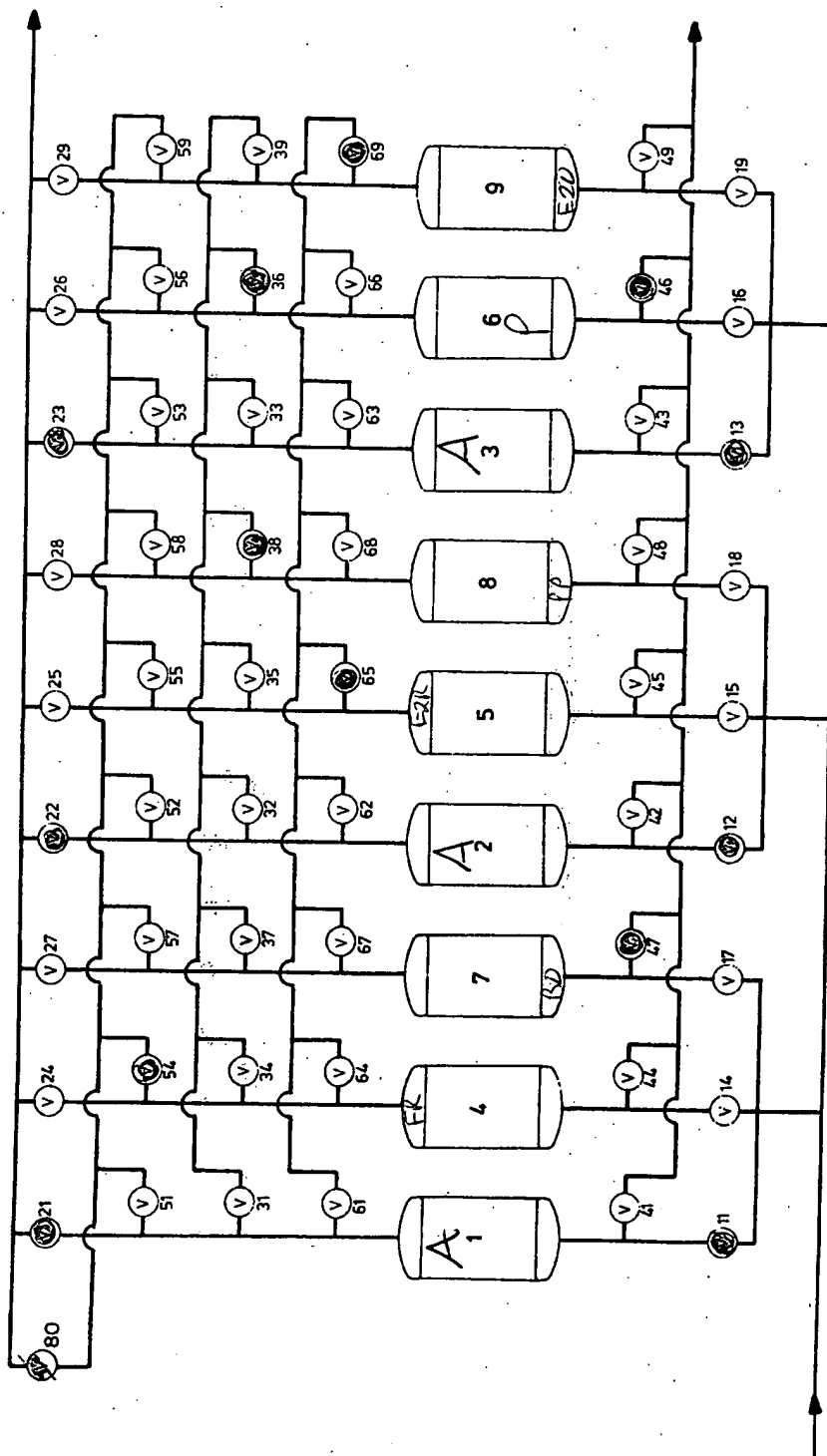
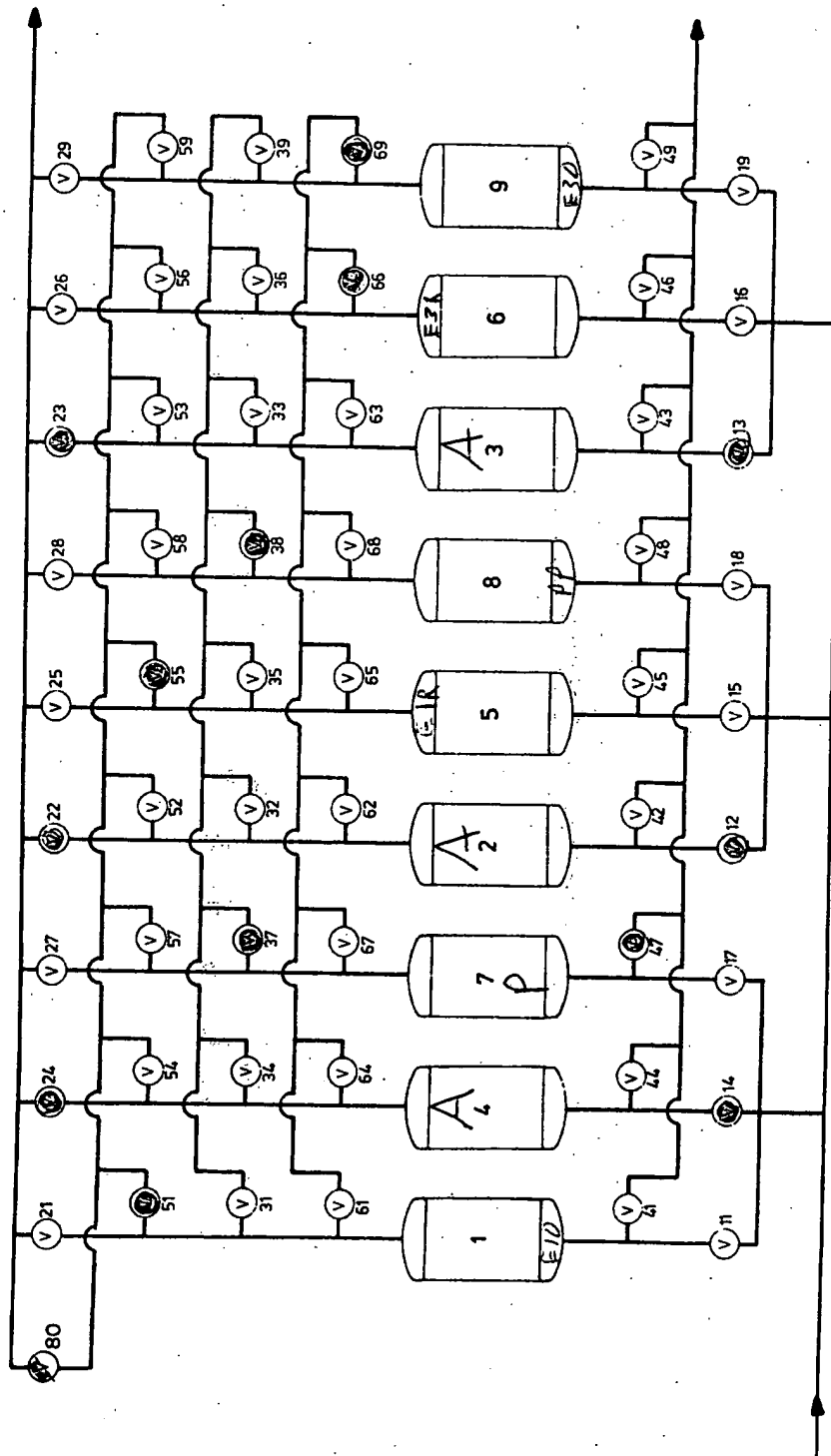


FIG. 5



Appendix 8

FIG. 5

